MEMORANDUM FOR: DDI/PPPM

21 Pers —

Ben —

The Army Civilian Personnel people sent this little gem to me. It's quite a scholarly paper & identifies only simulation is the right way to go.

Ray 2/23

SANDY
RAY AO
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Date

# MANPOWER PLANNING: RESEARCH SURVEY and PRACTICAL APPLICATION

BARRY KEFAUVER

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# CHAPTER I

## Introduction

### Purpose of the Paper

It is the intent of this study to bridge what has been in the author's academic experience the "gap" between the typical academic exercise and the harsh reality of management application. The objective, then, is to explore the area of manpower planning and the relevance of general systems theory to it. Further, in order to enhance the meaning and value of the research in terms of applicability to the author's real-world needs, the boundaries and constraints of the analysis will be designed around the Federal agency, specifically, whenever appropriate, the author's employer, the Federal Trade Commission.

### Frame of Reference -- General Systems Theory

General systems theory in its essential, pure form is an ideal approach in analyzing a complex problem such as manpower planning. For example, there are a wide variety of not only internal variables relative to the organization itself, but also equally significant exogenous influences that must be considered in a comprehensive survey of the system. Further, a broad-gauge framework is necessary to incorporate sufficient

interdisciplinary perspectives in order to capture the full range of elements that bear on the system as a whole.

Manpower planning has been described in a variety of ways by a number of observers of the field. For purposes of this analysis the definition proposed by Walker will be used: "Manpower planning refers to the rather complex task of forecasting and planning for the right numbers and the right kinds of people at the right places and the right times to perform activities that will benefit both the organization and the individuals in it."[1] This generalized definition is particularly appropriate as an operational term when pursuing general systems theory application.

The use of this definition demands that the full realm of influences be considered. Weber[2] outlines the framework for a manpower planning tool that permits the representation of the widely-varying interrelationships that one encounters when attempting to model a system involving human/social concerns. This entails the work of the behavioral scientist in viewing not only individual behavior as entities unto themselves, but also the collective behaviors of such individuals as employees in determining organizational behavior.[3]

Further, the manpower planning analyst must also

evaluate the effects of personnel policy decisions, the labor market (both external in terms of competing employers and internal in terms of already-available resources), and overall organizational functions relative to goals and objectives and the agency's (this paper will be couched, as mentioned, in terms of the Federal bureaucracy) legislative reason for being.[4]

Unfortunately, this researcher found that the plethora of techniques that have been proposed focus on only one variable or function in the overall system while holding all others constant. Ferguson[5] has criticized this approach as lacking integration and being far too narrow in concept. For example, a large part of the literature surveyed placed total emphasis on the mathematical formulae generally resulting in a replacement table that simply extends an organization's status quo into the future, basing its formulation solely on historical experience. Obviously, this approach is a very dull management tool.

This author, perhaps more as a function of a prior exposure than objective systematic analysis, developed the mental hypothesis that a Forrester[6] type of dynamic formulation would provide the most appropriate conceptual foundation for a manpower planning model. Tenacity tempered by research has resulted in a retention, albeit in

modified form, of this original assumption. This will be further discussed later in the paper.

Wilson's[7] pluralistic social systems concept is of especial relevance in recognizing that organizations share three external social systems and three internal subsystems. The first of these is economic in the sense that an organization must allocate limited resources in order to provide its desired output of goals and/or services. Second, the organization provides jobs and such jobs fall into patterns of career systems. Third, the organization has to regulate its internal power and influence groups to regulate conflict between internal interest groups and external political subsystems. These three characteristics and their respective interdependencies establish the general environment in which the manpower planner must operate.

Manpower forecasting has had a long if not necessarily distinguished history. Early demographers, administrators, and statisticians have utilized such analyses. Early actuaries constructed life tables to be used as one of the first major forecasting devices.

These ventures into prognostication were the essentials of manpower planning and have persisted as such to the present. This author's survey of the literature leads him to conclude that the primary thrust of manpower planning has been in a macroeconomic sense in that national estimates of labor needs abound. Nevertheless, the procedures have also found their way into microeconomic practice by a variety of organizations attempting to get a handle on the uncertainties of the labor markets.[9]

A sizeable portion of the research for this paper involved discussions with manpower planning officials in several different Federal agencies who share one element of commonality, the search for relative stabilities in relationships. The methodology employed varies considerably in complexity and resulting validity. With all the "scientific" tools and techniques employed, the general systems approach to manpower planning still requires extensive inputs in the form of "art". The manager's experience, expertise, and judgement are essential ingredients in a comprehensive planning system.

The author had as one of his original objectives in pursuing this area, the development of a managerially useful algorithm for manpower planning at the Federal Trade Commission. A general systems theory approach to this was viewed as most appropriate in order to bring the manpower planning function into total organizational perspective. In particular, the author was interested in incorporating manpower planning as an integral, essential, and key component of other administrative subsystems such as budget formulation and facilities planning.

# CHAPTER II

## Reasons for and Benefits of Manpower Planning

In researching this paper it was the author's experience that a great deal of work has been done in the area of manpower planning, but a great portion of it has involved effort outside the United States. Both research and practical application fit this description. What, if anything, should cause the United States to lag behind or, more positively, for other countries (including some of the underdeveloped countries) to assume the lead? What values accrue to organizations that engage in manpower planning?

Bassett[10] maintains that the competition characterizing our highly complex modern society necessitates manpower planning and forecasting in order for corporate entities to retain their respective positions and, more basically, just to cope with the needs of the highly specialized, involved consumers who must be served. Bassett goes a bit further by stating that the individuals who are responsible for manpower planning need to develop a wider variety of skills -- skills that would allow the practitioner to take a general systems approach.

Walker[11] states that "the value of forecasting to management lies in improved allocation of manpower in the organization and thus, ultimately, in increased organizational effectiveness." In this sense a country, company, or Federal regulatory agency can become an improved entity and achieve its objectives more effectively through the planned, systematic analysis and development of what is often described as an organization's most important single resource, its employees.

Coleman[12] shares a similar viewpoint in that he feels that organizations and nations will not be able to meet the challenges of the future without appropriate manpower planning and programming. He indicates that significant advances must be made to upgrade the quality, both conceptually and operationally, to accomplish this. Coleman suggests that it is essential that a flexible, comprehensive framework must be sought to provide the appropriate vehicle for specific manpower planning systems tailored to the needs of specific organizations. Perhaps the nations cited earlier as progressing most rapidly in the area of manpower planning are those that perceive the challenges more acutely, for example those countries that have critical manpower problems have responded to them by developing manpower planning programs. It seems also that Coleman

is offering general systems theory as the medium through which such efforts could prove most fruitful.

Rooney[13] raises a wide variety of points relative to the radically changing nature of organizations and the critical need for adaptation to these changes. He indicates that the "tensions" derived from these changes create the conditions for further change. The organization, thus affected from within, is simultaneously interacting with its environment and consequently must change with the environment. Rooney points out that although hindsight may be the best data base, proper planning is the only realistic answer to this problem of internal and external dynamics. He urges that manpower planning processes should take on broad parameters in the best of the general systems theory manner.

Mahoney and Milkovich[14] contend that the internal labor market reflects economic markets in general and the firm's interaction with forces outside the system create conditions that demand systematic, comprehensive analysis. The internal market is conceptualized as a "web of rules" or policies determining processing, allocation, and development, necessitating appropriate consideration in manpower planning. Mahoney and Milkovich offer as the approach a

stochastic process (Markov) model to explore the impact of alternative manpower policies and strategies. They offer a model for long term (10 year) planning.

Essentially, the short term, a single year, yielded far more accurate results than those for longer time frames. Particularly, the relationships between turnover and tenure causes problems for the Markovian model and, according to Mahoney and Milkovich, organizational occupational specialties must be included in any analysis to be meaningful. This would be of concern to general systems theory.

Agizy[15] brings new dimensions to the manpower planning process in that he feels that effectiveness and dollars are important concerns for manpower planning and necessary ingredients for skills analysis. More specifically, he designed a model to minimize manpower costs over a given period of time while simultaneously estimating workload distributions and necessary skills. He felt that the necessity of this type of unified analysis revolved around the need to arrive at product cost/price decisions. The process is, of course, made more complex by uncertainty. Nevertheless, this is essentially manpower planning, in that it involves manpower decisions over time in the face of uncertainty.

Agizy's primary input into his model was historical data. Historical data also provided the needed comparisons to assess the productive validity of the model developed. Of particular importance were the constraints Agizy developed, and they are of particular relevance to this paper since this author is concerned primarily with the Federal bureaucracy, and the manpower ceiling exogeneously imposed. Also, Agizy is concerned, and indicates in a general systems theory sense that all manpower plans should be with both operational and strategic planning. These distinctions are of special interest to the needs of Federal Trade Commission management.

Gear, Gillespie, Lockett and Pearson[16] raise very significant points that demand mentioning. They explore the necessity ofevaluating the alternative returns and benefits to the organization through the use of various policy determinations and competing resource allocations. They do this not only in terms of present project opportunities, but also recruitment avenues. They used linear programming techniques to ascribe values in money units to various alternative projects. The authors raise a number of unanswered questions, one of which was of primary importance to this paper and concerned the validity of deterministic assumptions regarding flows and their validity in what are essentially stochastic processes.

Walmsley[17] indicates that manpower planning is necessary because generally organizations are static in terms of employees (at least quantitatively), but are dynamic in terms of the technological and other kinds of changes that they are continually undergoing. This changes the relative complexion of the skills and functions necessary for the organization to continue to survive. He feels that it is also incumbent on the organization in a human relations sense to manpower plan in order to provide careers and occupational mobility for its employees rather than to simply engage in hire-or-fire decision making.

As did a large number of the authors surveyed, Walmsley found it absolutely necessary to limit the number of occupational categories incorporated in a manpower planning process. Treires[18] recognized this problem as it affects the Federal establishment and proposed a solution that several authors have utilized to advantage.

As an important consideration in the area of manpower planning at the Federal Trade Commission, although perhaps not totally appropriate to this Chapter, it is necessary to outline Treires' proposal. He does raise some reasons and by-products of manpower planning.

Treires felt that manpower planning in the Federal service needs to face facts. Not just the facts and figures relative to age, sex, occupation, length of service, skills level etc., but also the fact that the occupational categories used to describe Federal employees constitute a formidable obstacle to realistic manpower analysis and planning. Since the occupational categories were designed for and continue to be used as basically classification and pay media. Manpower planning had no place in that structure.

Manpower planning requires data that reflect several significant changes in an agency's workforce and its requirements for specific skills. But the skills levels must be recognizable in existing manpower supply data and be translatable both to a specific Federal grade and classification series. The manpower planner must provide that bridge between what is now the reality of the labor force and past, present, and future manpower situations.

Treires correctly points out that there are far more titles than there are mutually exclusive skilled occupations in the Federal workforce. There are currently nearly 2,000 such titles. Conversely, private industry (through the 1970 census) shows only 400 titles being used in private enterprise. The Bureau of Labor Statistics uses about 160 job titles.

A manpower plan that tried to disaggregate to the extent of 2,000 titles would encounter immediate problems.

Further, existing series do not have useful sub-aggregations. For example, one of the most important (to the FTC) categories, the GS-900 Legal and Kindred, includes not only attorneys but also legal clerks.

The Navy Department has implemented an interim solution. Even though the defense-oriented agency has its own unique problems, all Federal agencies are covered by the same system and in varying degrees share the problem.

The "problem" more specifically begins in the initial historical data-gathering phase. Treires' approach reshuffles the 2,000 job classifications into one-tenth of that and then segments them further into the major occupational groups recognized by national labor-force statistics. This last step is the key to analysis in a general systems sense. That is, it is necessary to define internal labor needs in terms of what the organization faces in reality in the labor market. The following depicts the results of this exercise:

It is also necessary to utilize this aggregating process to recognize the realities of the Civil Service recruitment process. It is easily conceivable and very often the case that a single individual could qualify for several different job series. For example, the manpower plan may require a legal clerk, GS-986, and a procurement assistant, GS-1144. A single individual, within grade-level paramaters, could fill this position. The occupational aggregations will not be as extensive for the Federal Trade Commission as they are for the Navy Department, but the concept remains as a valid consideration in the model that will eventually emerge.

# CHAPTER III

## Issues and Trends

### General

The conceptual foundations of mathematical quantitative approaches to manpower analysis began with the military as a product of necessity during World War II. The earlier crude attempts at statistical analysis were limited to rudimentary applications. Although far more elaborate computer assisted processes exist currently, much of manpower planning remains unchanged. However, some organizations, particularly those in Europe, have developed modeling techniques of the Monte Carlo genre.

Over the last several years, a great deal of attention has been given to modeling of manpower systems. The Civil Service Commission has assembled a comprehensive bibliography[19] annotating a large number of sources. Worthy of special mention are the discussions by Charnes, Cooper and Niehaus.[20] Charnes, Cooper and Niehaus have done extensive work in the area of multi-level modeling in formulating the Navy Department's manpower planning process. Their approach will be discussed in detail in this paper.

Monte Carlo Models

Hillier and Lieberman[21] provide an excellent description of Monte Carlo models as vehicles for organizational experiments. As such, they allow the organizational analyst to enhance his knowledge of the impact of a wide variety of decisions and policies. Obviously, such knowledge would be impossible if one had only the organization itself with which to experiment. Such models, however, do lack the precision necessary to be truly useful planning devices, particularly when it is necessary to disaggregate the elements of the system. Such modeling techniques have been applied by Lieberman[22] at the Navy Department in the so-called ADSTAP models used for analyses of enlisted personnel. Most of the modeling techniques in the Federal government are concentrated within the Defense-related agencies, probably because of the early influences of the military.

Bonini[23] and Weber[24] both have emphasized behavioral science concerns in micro-level manpower planning. These approaches are of the one-variable-at-a-time type which, although they purport to be, are not consistent with the macro-context that would be derived from a general systems theory approach.

Forrester[25] has observed that frequently disturbing counter-inituitive results are obtained when combining a series of the Weber-type of propositions into a total systems concept.

All of the aforementioned techniques, taken singly, as identified by Forrester, do not provide the comprehensive analytical tool to massage today's complex Federal organization. This author's search, then, was concentrated on the media for viewing all of these elements as a whole, i.e. as a general system.

Analytical Models

Differing from the Monte Carlo models are the analytical models whose primary objective is the abstraction of the essentials of a problem in revealing the underlying structure of the system being analyzed.[26] This approach comes closer to a general systems theory of manpower planning than nearly all other techniques researched by the author. Frequently, this approach allows the analyst to simultaneously consider all facets and variables associated with manpower planning problems. Such models incorporate computer assisted mathematical programming to include an optimizing function. These analytical models are roughly classified as Markov process models, mathematical programming models, activity analyses and

input-output types, and combinations of these such as dynamic systems modeling.[27] This author was interested in looking at the last kind of technique in order as did Niehaus, to develop an approach that combines the best features of several techniques into one modeling system that best meets the manpower planning needs of the Federal Trade Commission. The following summarizes the various approaches and sets the stage for the development of a synthesized general systems theory framework for the FTC problem.

Markov Models

Markov models are usually of a matrix nature that multiply a vector of personnel in various job categories by a matrix of transition rates which allows for a projection of current workforce based on historical trends. (This, although not acceptably general enough, is essentially the seat-of-the-pants, ad hoc approach currently employed by the FTC.) These models are stochastic which means that errors of observation and other sources of variability about the underlying true value to be estimated are evaluated. As differentiated from deterministic approaches, stochastic processes are described in terms of a probability distribution in which an unequivocal relationship between two or more variables is not rigidly defined

and results in a distribution of projections over a range of probabilities.[28] Kane[29] has also suggested application of a Markov model to validate the "Peter Principle".

The transition matrix provides the interconnection between the internal and external manpower flows over several time periods, providing an element necessary for recognition of the dynamic nature of manpower projections. Applications have involved embedding Markov models into general mathematical decision models that are intended for optimization of decision criteria.[30]

Mathematical Programming Models

Most manpower planning activity observed by the author in the Federal service that incorporates linear programming are simply static assignment models that provide little planning capability and, when relied on exclusively, could prove conterproductive by limiting management perspective. Niehaus suggests that such attempts have been applied as cost minimizing models and resulted in recommendations that only low-paid employees be hired and high-paid ones be fired -- not a particularly realistic output.

Charnes, Cooper and Ferguson[31] designed one of the earliest goal programming models for General Electric in 1954. The significance of this exercise was that a series of managerial goals was established subject to a set of constraints in which model iterations were carried out in an effort to achieve as many of the targets as possible. The constraints were executive attributes of employees and the targets were executive salaries. Although formulated in a non-linear way, these models are transformed to linear equivalents for optimization. This is critical in that manipulation of the models is enormously simplified through the use of readily available software packages that provide the capability for standard linear programming transformations.

The application of these models has been accompanied by substantial difficulty. Whether as a cause or effect, the essential problem has been the acceptance and understanding by the manager-user of the models. Such models have not been able to cope with multiple time frames for planning, which only serves to emphasize that manpower analysis involves a number of variables (and their consequent equations), underscoring the necessity for a general systems theory approach.

The goal programming models utilizing Markov processes allow for a dynamic analysis with appropriate probabilistic adjustments, combining the expeditious mathematical feasibility with the capacity to plan for several time horizons. The most important characteristic of goal programming models is that they will accomodate simultaneous budget planning with the manpower planning process.

Activity Analysis and Input - Output Models

Leontief[32] pioneered the use of activity analysis and input-output models to specifically satisfy the needs of static equilibrium analysis in economics. Such applications have been attempted in the area of manpower planning and have proven of some value. For example, the Navy Department has used this approach in cost allocation for budget planning. Such an exercise, in this author's opinion, has not really addressed the need for dynamic flexibility, the most frequent missing element in manpower modeling, but perhaps the most important feature, at least in the value structure this author originally established in researching this area.

Multi-Level Models

Charnes, Cooper, Niehaus, and Shultz,[33] as oft-referenced elsewhere in this paper, seemed to have made considerable progress in formulating dynamic models for manpower and personnel planning by combining the best features of the previously discussed techniques into a unified system. Their efforts are, in the classical sense, general systems theory at work in an effort to solve the real-world problem of manpower planning. Therefore, the discussion of this approach will go into greater detail than the more fragmented modeling vehicles outlined thus far.

It is necessary to distinguish between a multi-level model and a multi-stage model. The latter uses results of the top stage of decision making as the constraints for subsequent stages of decisions. For example, a Monte Carlo simulation could be used to allocate resources followed by a linear programming model to arrive at manpower planning decisions. The multi-level model considers the two levels of decisions simultaneously, making each "set" of decisions, because they are determined together, more reflective of the system being modeled. Niehaus indicates that his example is the only operating model that considers the multi-level, general systems theory considerations.

Dynamic Models

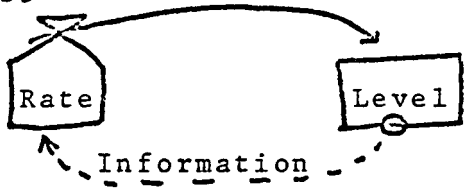
Jay Forrester has pioneered what could be termed the generalized school of general systems theory. To model the dynamic behavior of a system, Forrester[34] feels that four hierachies must be recognized:

Closed boundary around the system
Feedback loops as the basic structural elements within the boundary
Level (state) variables representing accumulations within the feedback loops
Rate (flow) variables representing activity within the feedback loops

[Goal
Observed condition
Detection of discrepancy
Action based on discrepancy] As components of a rate variable

Perhaps the most difficult phase of the development of a dynamic model is the establishment of the boundary in which system interactions occur. It must be remembered that the closed-boundary concept implies that the behavior being investigated is not a product of influences outside the system, but from within. However, the general systems theory concept would demand that outside occurences be considered as they affect the system. A dynamic model would recognize these influences but would view them as happenings that do not give the system its inherent characteristics.

Feedback loops are the essentials of a dynamic model. Such a loop contains rate and level variables tied together by information. The following depicts such a loop:[35]




Levels are accumulations (mathematically, integrations) resulting from a rate of flow. The levels in turn provide information for use by the rate equations. No rate can directly another rate and no level can directly affect another level. Rates are analogous to policies that have contained within them a goal toward which or away from the system is tending. The rates recognize lags and discrepancies between goals and observed system realities.

# CHAPTER IV

## The Environment

### The Federal Trade Commission

The Federal Trade Commission (FTC) is an independent regulatory agency with two primary legislative objectives: Trade regulation, basically involving legal casework centering around corporate merger activity; Protection of the consumer from fraudulent, deceptive, unfair, or otherwise illegal business practices. Of recent particular interest have been such specialized, precedent-setting concerns as advertising directed to children, substantiation of product performance claims, and measures designed to aid in solving energy-related problems.

The agency employs approximately 1,600 people nationwide with an annual budget of $35,000,000. It is obvious that the FTC has an exceptionally broad mission and very limited resources to accomplish it.

Because of the legal nature of the agency's work product, the largest single occupational speciality in the FTC is attorney. Such employees are in the excepted segment of the Federal Civil Service, which means that the agency is responsible for locating and retaining its own legal staff.

Structurally, the FTC maintains its headquarters in Washington, D.C. with field offices in 12 of the nation's largest metropolitan areas. In addition to attorneys, the agency also employes economists (primarily Ph.D.'s in industrial organization), accountants (both operating and staff), administrative and management types, consumer protection specialists (a nationwide position that is unique to the FTC), and the full gamut of clerical and technical support staff. All of these positions are in the Federal competitive service which requires Civil Service Commission approval and review before hiring can be accomplished. This process entails a highly significant constraint that must be given especial attention in the manpower planning system.

As do most other agencies, the FTC operates under other resource allocation constraints. Of prime importance is the budget process whereby Congress and the Office of Management and Budget annually provide the wherewithall for the agency to accomplish its objectives. At the present time, the budget formulation process is carried out in a manner quite independent from the existing manpower planning efforts. There has been no marriage of the dollars and people in the planning and programming of agency activities.

It is no secret that one of the most oft-mentioned shortcomings of the agency is its lack of systematic program and priority planning based on cost/benefit considerations.[36] The annual paper-generating exercise that produces the budget is symptomatic of this. In all fairness, it should be pointed out that agency managers have recognized this deficiency and are currently seeking appropriate remedial avenues. It is one of the author's objectives to bring these two essentials together into one cohesive and meaningful framework.

It is important to recognize the characteristics of the FTC as environmental components comprising the system under study. The relatively small size, highly professional, and broadly diverse employee mix are examples of such concerns. Of perhaps greatest relevance are the political realities under which a regulatory agency must operate. All of the sophisticated systems theory tools and techniques will yield little tangible benefit if the political essentials are not dealt with effectively.

The FTC serves a crucial, vital role in today's economy, affecting virtually every segment of business and the consuming public. It is critical, then, that the FTC utilize a general systems approach to determine the best ways to deliver its services. Because over 80% of its annual

dollar resources are for salaries and wages, the planning of manpower is paramount. Prior to this author's research, planning for the use of manpower has been an ad hoc, catch-as-catch-can process in which data are generated for each specific analysis (not necessarily related) that have relevance only for a finite point in time with limited organizational application and, of greatest significance, minimal management involvement. The next chapter is intended to synthesize the author's research findings in his attempts to explore (essentially virgin territory for the author) the techniques and conceptual foundations of current manpower planning processes, and apply them to the development of a model to be used by the Federal Trade Commission.

# CHAPTER V

## Synthesis of the Research

As the foregoing indicates, manpower planning is a desirable, indeed essential, ingredient to meet the needs of today's complex organization. The Federal Trade Commission is certainly no exception to this and, in light of the very limited resources to accomplish its broad mission, is the ideal vehicle for such an application.

The research conducted for this paper leads the author to conclude that the Forrester dynamic model is the best approach to use in designing a model for the Federal Trade Commission. This conclusion is based on several considerations, not the least of which is this author's á priori bias toward Forrester. Also, the dynamic model makes a great deal of sense to the operating manager and can be much more readily and completely comprehended than one consisting of lengthy, esoteric mathematical formulae. After all, the typical FTC manager is an attorney with a limited quantitative exposure. This clarity and forthrightness will aid in "selling" the model and consequently assist in implementation. The best conceived, most soundly-based theoretical model has no value if top management rejects it!

Despite a comment made by Jay Forrester to this author, this approach will be utilized. Mr. Forrester's comment was in response to a question I asked regarding the modeling of social systems such as manpower planning at the Federal Trade Commission. Specifically, he indicated that current (the question was posed in 1971) state-of-the-art calculus would not be adequate to provide a truly reliable dynamic model utilizing the DYNAMO language. However, as was his usual posture, Forrester countered by suggesting that a dynamic model would still provide a great deal of mileage, perhaps more than any other technique, in the sense of getting a solid "handle" on the essentials of the system and the nature of the interrelationships of the system's elements. This author feels that this area, understanding of the macro-system, is where the real payoff lies for general systems theory. Therefore, it is this concept that will be used in model formulation.

Attachment 1 depicts one sector of the model using conventional dynamic model flow charting elements. For the purposes of this paper, the attorney sector will be the only one formally presented. The attorney complement is of great significance to the agency in terms of number of employees as well as the fiscal resources which they absorb. The other sectors, although not presented herein

in diagrammatic form, will be as thoroughly refined as the attorney sector. Each of the ten sectors (secretaries, clerks, consumer protection specialists, economists, administrative-professional, administrative-nonprofessional, other professional, wage grade, and consultants) has been chosen with a view toward comprehensiveness and disaggregation to the extent necessary to plan by occupational category. The sectors do, however, have the potential to relate directly back (a la Treires) to national manpower/occupational surveys, providing that all-important environmental perspective of the labor market. The elements of each sub-system sector will, with occupationally tailored modifications, appear very similar to those incorporated in the attorney sector.

The flow chart of the attorney sector is reasonably self-explanatory. The system incorporates both dollars and employees into an integrated whole. The "payoff" element that all sectors eventually feed into is the agency productivity. This is expressed as a level and, in practice, will be in terms of economic impact of agency activities at the consumer level. In its most ideal, this would indicate the dollar savings in the marketplace accruing to the consumer because the Federal Trade Commission exists.

The model depicts essentially two types of attorney input which taken together from the total source of supply for agency legal staff, i.e., on campus recruitment yielding inexperienced talent and the attorney labor market providing applicants already in practice. The productivity of each of these kinds of employees is affected by acclimation times, expressed in the model as parameters. Since the agency pays a premium of up to 100% in salary differential for an experienced attorney over one fresh from law school, it will prove particularly interesting to determine the sensitivity of the system to these acclimation rates.

Data will be generated for the most part from already existing sources. Productivity figures, separation rates, labor supply quotients, etc. can be determined through rigorous review of FTC related materials. It is intended that workload and agency activity variables will be generated empirically through an interdisciplinary, in-house task force. The auxiliary, Agency Activity Multiplier, is incorporated to euphemistically, although overtly, recognize the influence of the factors that could best be generally termed the "politics" of the FTC. This has an immediate and direct impact on agency results (productivity and its utility will be determined in the same interdisciplinary way as discussed above).

The implementation of the manpower model will be carried out in a manner consistent with general systems theory concepts and procedures indicated as most effective through previous research this author has conducted not directly related to this paper. Specifically, those affected by the model, the managers and supervisors, will have representation on a cross-disciplinary team to 1.) refine the model and 2.) monitor its testing and validation. It is intended that DYNAMO type equations will be formulated and the model will be run on a continuing basis using a DYNAMO compiler.

# CHAPTER VI

## Conclusions - Additional Research

All of the foregoing indicates that the field of manpower planning is alive and well and fully deserves management attention at the Federal Trade Commission. This project has provided the stimulus that will be utilized as a point of departure in developing an integrated planning model for FTC activities.

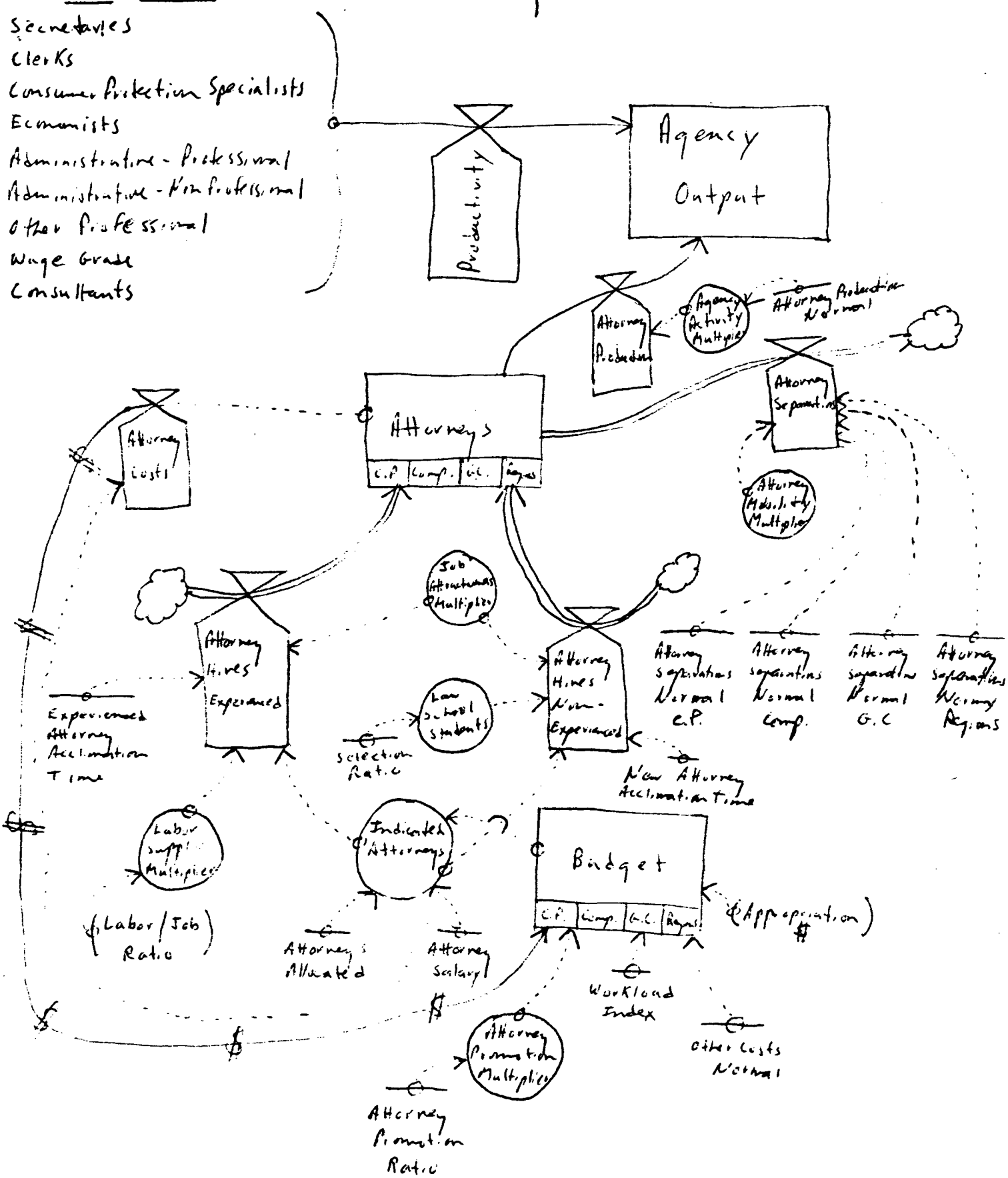
Even though the model developed as a result of this research undertaking justifies the effort expended in its creation, there are a number of loose ends that should be disposed of through further refinement. Of particular importance are the development of the parameters based on historical data. The separation rates should receive special attention. Also, the model should be tied into an automated retrieval and storage information system that will provide from the personnel actions, a continuingly updated file that can be searched on occupational, organizational, chronological, and cyclical bases to forecast, as modified by the appropriate auxiliary equations, the trends of the future.

Dynamics Model

Attorney Sector

Other Sectors

Secretaries
Clerks
Consumer Protection Specialists
Economists
Administrative - Professional
Administrative - Non Professional
Other Professional
Wage Grade
Consultants



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